

Volumetric Studies of Earth's Electron Foreshock Using PEACE Data

Melvyn L. Goldstein¹, Chris Gurgiolo², Andrew Fazakerley³

¹ NASA Goddard Space Flight Center, Greenbelt, MD

² Bitterroot Basic Research, Bitterroot, MT

³ University College London, Mullard Space Science Laboratory, Dorking, Surrey, UK

We describe the methodology used to set up and compute spatial derivatives of the electron moments using data acquired by the Plasma Electron And Current Experiment (PEACE) electron data from the four Cluster spacecraft. The results are used to investigate electron vorticity in the foreshock. What is found is that much of the measured vorticity, under nominal conditions, appears to be caused by changes in the flow direction of the return (either reflected or leakage from the magnetosheath) and strahl electron populations as they couple to changes in the magnetic field orientation. This in turn results in deflections in the total bulk velocity.